

DECEMBER, 1913

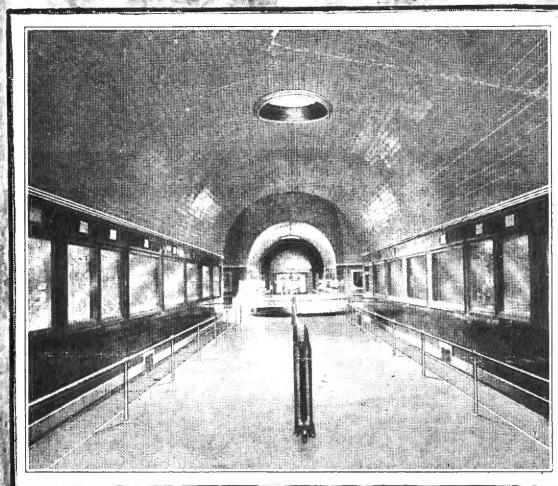
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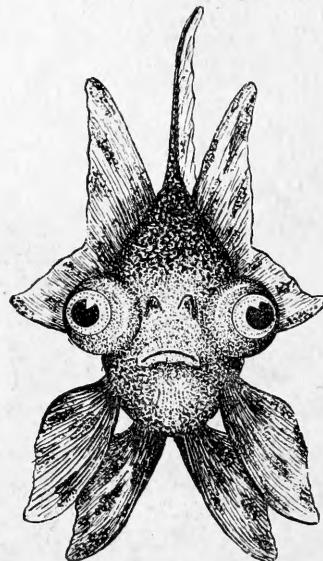
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THE AQUARIUM

VOLUME II

DECEMBER, 1913

NUMBER 7

On the Family Pterycomidae

By R. W. SHUFELDT, C. M. Z. S., Etc.

Last spring I published an illustrated paper entitled "Professor Robert Collett on *Pterycombus brama*, Fries,"¹ which was a translation of the original paper by that eminent naturalist which appeared in Norwegian many years previously.² As my former paper is quite accessible, it will not be necessary to reproduce it to any extent here, that is, beyond drawing upon the data it contained, in order to accomplish the purpose of the present article.

My translation of Collett's work was considerably augmented by notes and comments of my own, among other things inviting especial attention to a former paper of mine on that unique fish *Grammicolepis brachiusculus*, Poey.³

Taking what appeared in these and other papers, together with the numer-

ous figures of skulls and skeletons of certain fishes I published in connection with them—all of which save the skeleton of *Pterycombus* were drawn by myself from the specimens—this last-named species was, upon the whole, pretty thoroughly compared, morphologically, with species which were its supposed nearest affines.

Pterycombus brama, the subject of this

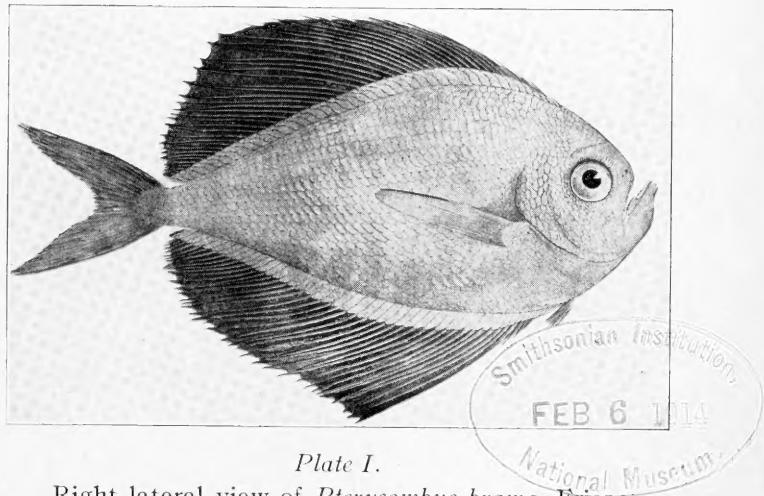


Plate I.
Right lateral view of *Pterycombus brama*, Fries.

paper, is a deep-sea form, of which less than ten specimens have ever fallen into the hands of science. These were all taken in Scandinavian waters, and are, with one exception, preserved in Norwegian museums.

The external appearance of this fish and the superficial characters of its skeleton are well shown in the two plates illustrating the present article. Professor

¹Proc. Biol. Soc., Washington, Vol. XXV, pp. 39-50.
Mar. 19, 1912. Plates II, III.

²Collett, R. Om *Pterycombus brama*, Fries. Bergen's Museum's Aarbog, 1896, No. VI, with two Plates. The two Plates referred to have been photographically copied by the present writer, and are reproduced in this contribution.

³Shufeldt, R. W. "Further Studies of *Grammicolepis brachiusculus*, Poey." Jour. Morph. Vol. II, No. 2, Nov., 1888, pp. 271-296, Figs. 1-14. In this article there is a translation by its author of Poey's account of the fish named, the original having appeared in Spanish (*Anal. de la Soc. Esp. de Hist. Nat.*, Tom. II., 1873, by Felipe Poey).



B. Fries, as early as 1837, first described the species, having met with the dried specimen in the State Museum of Stockholm. It was then a new form, and he placed it with the *Scombridae*, claiming that *Pteraclis* was the nearest relative.

Nineteen years subsequently, Professor Nilsson examined the same specimen studied by Fries, and came to the conclusion that *Pterycombus* was most nearly related to *Brama*, and together with this genus he arrayed both with the *Squamipinnes*. Ten years later, Professor Lilljeborg proved that the latter relationship was only a remote one, and that both species were scombridine types, so he arrayed them with the *Scombridae*.

Lutken, Gill, Jordan and Gilbert all followed their predecessors and retained, in their several works, *Pterycombus brama* in the family *Bramidae*.

Here the taxonomy of the form practically stood until Professor Collett published his paper on the subject, and which, as has been pointed out above, I published in English with added notes. In that paper, as well as in my trans-

lation, Collett states: "In its skeletal characters *Pterycombus* comes nearest *Brama*; but it departs from that species in a number of osteological details or characters, especially in the morphology of the spinal column. The massive development of the ribs is particularly striking, the neural spines and the dorsal interspinous form together an almost solid, perpendicular wall of bone, which is entirely different from anything known as pertaining to the other genera of the *Scombroids*. In this respect it so far departs from what we find in its apparently nearest relative *Brama*, that it should probably be placed in a family by itself."

This, however, is as far as Professor Collett ever went in this matter, and in a foot-note on page 46 of my translation, I further remarked that "The skeletal and other characters, given above by Professor Collett, found in *Pterycombus brama* are ample, in my opinion, to justify the establishment of the family *Pterycombidæ*." But up to the present moment, neither I, nor any other naturalist, as far as I am aware, have actually placed on record, or published, the establishment of any such family.

I am still convinced, and Professor Collett writes me that he is still convinced, that the skeletal structure of *Pterycombus brama* is alone sufficient to entitle it to family rank, and this should be accorded it, if for no other reason than to widen the gap between it and

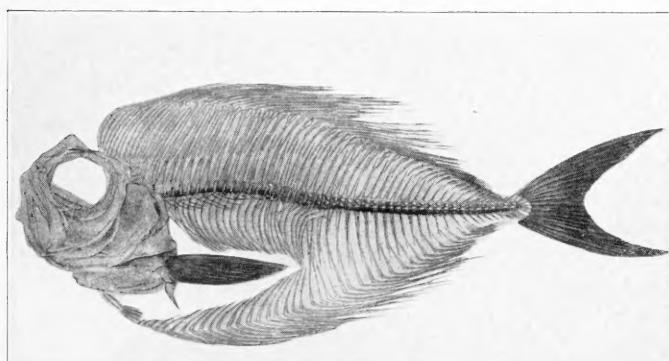


Plate II.

Left lateral view of the articulated skeleton of *Pterycombus brama*, Fries. Both plates by Shufeldt after Collett.



the *Bramidae*, which latter family—or the species of the genus *Brama* of that family—differ, osteologically, so widely from *Pterycombus*.

I have already pointed out in my Biological Society paper the fact that *Pterycombus* and *Grammicolepis* are related genera, and that the latter was separated from the *Bramidae* by Poey and made a distinct family, — the *Grammicolepidiae*.

My object in publishing the present contribution to the subject is to establish the family *Pterycombidae*.

The literature—or the essential part of it—I have already published in my previous paper, obviating the necessity of reproducing it here. So far as I am aware, there is no family or subfamily synonymy to be recorded.

PTERYCOMBIDAE

Diagnosis

Sombroidea with the fronto-occipital crest of the cranium low and short, and formed almost entirely by the frontals; its greatest height (opposite middle of orbit) equals one-fourth the orbital diameter; the portion between posterior margin of supraoccipital and first interspinal, superior to the occipital bone, is membranous in structure and of a triangular contour. Dorso-horizontal surface of cranium, supporting the crest, and formed by supraoccipital and frontals, has a length equal to the diameter of an orbit.⁴

Twenty-three pairs of ribs, the fourth to the twenty-third inclusive being characteristic of the family, a typical pair being seen in the eighteenth. (See Fig. 1.) The description of this pair may

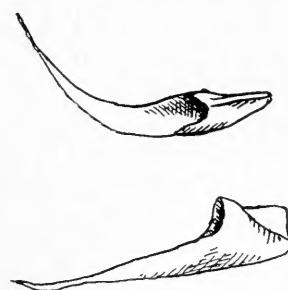


Fig. I.

Views of the eighteenth pair of ribs of *Pterycombus brama*, natural size.
Shufeldt, after Collett.

be stated as follows: The vertebral extremity, which is intimately articulated at the external aspect of the parapophysis, is almost cubical in form, and is excavated as far as its vertebral end. This concavity is continued as a groove for a little way down along the mesial border of the rib, and thereafter terminates in a long, extremely attenuated free ending.

DESCRIPTION

(*Pterycombus brama*)

Body broadly ovate, somewhat transversely compressed, graduated from anterior third to the caudal and with peduncle of latter somewhat slender and continued into the tail.

Color, superior to the lateral line, rich steel-blue, exhibiting a purple and green iridescence; all below the lateral line, shiny silver color. Base of the pectoral fin, mesiad, blue-black. Ventral fins, superiorly, black, with mesial apex whitish and transparent. Iris very pale yellow; sclerotic, superiorly, bluish black.

Lateral line possesses 48 scales (21 to apex of pectoral fin); scales in 11 rows, spinous; rows 5-6, ventrally, and rows 3-4, dorsally, almost smooth.

⁴In *Brama* this area is twice as long as the diameter of one of its orbits.



Rays. Dorsal, 9/44; Anal, 3/39; Ventral, 1/5; Pectoral, 2/18.

Head completes anterior contour of body.

Eyes within anterior half of the head, lateral with very slight upward inclination.

Mouth obliquely cleft downwards and backwards, lower jaw closing within upper.

Gills, anterior arch supporting eight rows of teeth, 6mm. in length, extending from a point about directly below the orbits, and continued forwards as rudimentary tubercles of the apex of the arch.

Inferior pharangeals support minute tubercles, while the remaining *branchial arches* are toothless, their places being taken by rudimentary tubercles.

Pseudobranchia, well developed.

Rays. Dorsal, 53. Anal, 41.

Tail. Deeply and acutely bifurcated.

Fins. Dorsal and anal, deep and broad, the dorsal commencing and ending with very short rays, intermediate ones graduated from end to end. Anal rays, anteriorly, very long, becoming gradually shorter, to terminate in a very short extreme posterior one. Pectoral rays long and fin narrow. *Ventrales*, anterior, small.

Skeleton exhibits subtypical characters of a Scombridean.

Cranium and Ribs, as given above.

Post-temporal, bifurcated, either bifurcation flat and broad.

Supracleavicle, long and narrow.

Postclavicle, with a long styliform process.

Hypocoracoid, narrow and directed anteriorly. Mesial border formed partly in

membrane; oval notch below its center.

Pelvic girdle, small and slender.

Ribs are 23 in number, of which twenty of the posterior pairs exhibit an unusual development. They are broad and hollow, and taken as a whole, form an osseous wall without open intervals as the ribs overlap. They are abbreviated, being attached to the downwardly produced vertebral apophyses in such a way that their truncated superior portions arrive at the center of each corresponding vertebra. The leading anterior rib is articulated with the third vertebra, and is much reduced. Second and third ribs somewhat broader at their articular ends, but taper rapidly to their free lower extremities, terminating in a long, filiform ventral free end.

Spinal column, composed of 50 vertebræ, of which 24 are thoracic, and 26 are caudal. Centrum of first vertebra is rudimentary in character, but with well developed neural spine.

Ribs, articulate with the third to the twenty-fourth vertebra, inclusive. (Characters of the *vertebrae* have been given in full by Professor Collett, and are reproduced in my translation, *loc. cit.*, pp. 48, 49).

Secondary ribs occur on all the anterior vertebræ, disappearing on the second or third ultimate abdominal ones.

On first and second vertebræ, they articulate with the haemal arch; on 3-7 with the vertebral centra; and the rest with the anterior surface of the dorsal margin of the rib.

Branchial arches, missing in all (?) the specimens; (need description from future material).

To be successful you must plan the start as well as the finish.



A New Method to Promote the Growth of Goldfish

By WM. L. PAULLIN

It is very often a difficult matter to get a young goldfish to grow. This can be very easily overcome by a method I have used for several years, a method which is also good for young tropical fish. Often you will find among your hatching one or two young fish that will not grow, no matter how much you feed them. I take each of these fish and place it in a glass jar holding one gallon of water. I feed them every day on live daphnia, always giving enough at a feeding to last during the day, and keeping the temperature of the water about 75° Fahrenheit. You will be surprised to find in a short time that the one gallon jar is too small for the fish. I increase the size of the jars once a month, one gallon at a time, until I am using a five gallon jar. At that time I have a fish that will pass for a three year old.

Fisherman's Stag

The Chicago Fish Fancier's Club will attend a Fisherman's Stag at the Hamilton Club of Chicago, on Saturday Eve., January 17th.

J. W. Gage, Editor of "The Aquarium," will speak, taking the subject of Fish from an Aquarist's Viewpoint.

Noted Woman Painter of Fish Life Dies

Mrs. Nellie Burrell Scott Exhibit for Panama Fair.

Mrs. Nellie Burrell Scott, who won international fame as a painter of fish life, died in San Francisco, November 17th, from a complication of diseases. Exhibitions of Mrs. Scott's canvases have

been made in every state in the Union, and one of the features of the art exhibit of the Panama-Pacific Exposition will be a collection of her paintings.

Hints on Paradise Fish

By HOWARD S. CREESE, Philadelphia.

Paradise fish, if in a healthy aquarium, will stand for a short period a very low temperature—say 40 degrees Fahrenheit. Exposure to so low a temperature for more than a day, however, would probably prove fatal. I saw fish of this species kept all last winter in water ranging in temperature from 50 to 60 degrees, but this is not advisable. In this particular instance there were very few fish and an abundance of plant life. Different persons have different experiences with the same kinds of fish, but from my own general observations I should say that it is not the best policy to attempt to keep Paradise fish, in the winter, in a temperature lower than 65 degrees or higher than 75 degrees. When the temperature gets above 75 degrees the fish are liable to start breeding, and unless one has special facilities for the rearing of the young, they will all be lost except those hatched in June, July and August.

When any of these tropical fish show the earliest signs of being afflicted by fungus they should at once be treated with mild salt water or some other remedy. Fungus diseases, when they once attack these fish, develop with surprising and distressing rapidity.

If a man never deals with you it may be his fault; but if he deals with you once and does not continue it is your fault.



The Detroit Aquarium

By RICHARD J. CONWAY,
Director of the Aquarium.

This aquarium is located on Belle Isle, a beautiful park situated in the Detroit River, connected with the city by a bridge. A regular auto-bus line runs every day in the year from the city to the aquarium, a distance of one and one-quarter miles. During the summer months a line of ferry boats furnishes an additional means of access.

The building is two hundred and sixty feet long and seventy-two feet wide; the grotto contains forty-four wall tanks, three large pools and three floor tanks. Twenty - two of the wall tanks are used for marine specimens; the pools are used for large fishes and harbor seal; the remaining wall tanks are used for fresh water specimens.

The fresh water supply is received from the city waterworks. The salt water used here was brought from the Atlantic Ocean about nine years ago, and has been in constant use since that time. The only addition to this supply is that which occurs when marine collections are made, when the water in which they are transported is filtered, and then put into a reservoir for use when needed.

A small fish hatchery is in operation to show the methods used in hatching

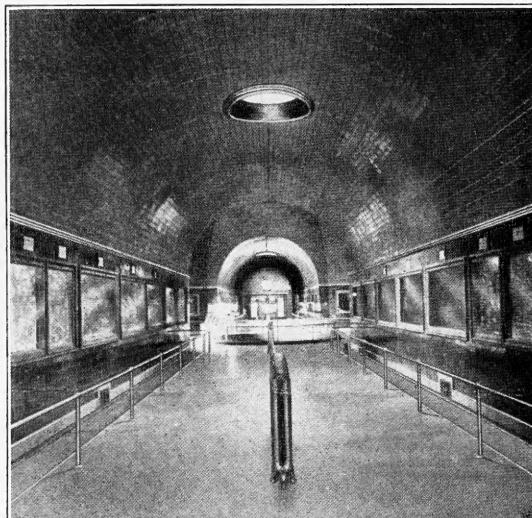
trout and white-fish eggs, also for hatching, for exhibition purposes, such trout and other eggs as are not found in our locality. Through the operation of this hatchery, species of trout not found in the waters of our state have been introduced.

The fish exhibited are collected from the many localities. Most of the fresh water fish are brought from the Great Lakes, inland lakes and their tributaries. The salt water species are collected along

the Atlantic coast, from Maine to Bermuda. Many of the Bermuda fish are especially beautiful. We have in our exhibit some specimens that have been in aquaria tanks containing about four hundred gallons of water for eight years, and as yet have not shown any signs of distress. They

appear to be contented, feed regularly, and have increased in size and weight more than four hundred per cent. This species is the Golden Ide (*Idus idus*).

Other specimens that have been kept in the tanks for seven years, such as the Muskellunge, do not show much increase in either size or weight. Data were kept of the amount of live food consumed by one of these specimens weighing seventeen pounds, and it was found to be satisfied with one and one-half pounds of food per week during the summer



GROTTO—AQUARIUM



months, when it was most active; in the winter months less than one pound per week sufficed.

Much has been said by aquarists about the food of the white-fish under these conditions. We have kept white-fish in aquaria tanks for over three years; this, I think, is the record. We have tried to induce them to take live minnows, yet I have never seen any of them take one, or even attempt to catch one. I have known this species to live in aquaria for six months without taking any food at all. Later we induced them to take raw beef.

I believe that the Sea Horse attracts more attention from the visitors than any other species we exhibit.

The aquarium was built by the city of Detroit, at a cost of about \$115,000.00; the cost of maintenance is about \$11,500.00 annually. It was opened to the public August 18, 1904, and is open to visitors every day in the year. Since the opening day, 6,857,874 persons have visited it, an average of 2,341 per day. These figures prove without a doubt that it is the most popular institution in the city.

In conclusion I may say that I am at a loss to know why more cities do not establish aquariums. In my opinion the result in advertising a city and furnish-

ing instruction to the people is most invaluable.

Useful Receipts

By CHAS. VON EFF, Brooklyn.

The following cements I have used, and know to be exceptionally good. If properly made and applied they will never leak a drop. Formula No. 1 should be applied while quite warm so that it will thoroughly take hold of both frame and glass; in fact, it is good

policy to warm glass and frame before cementing.

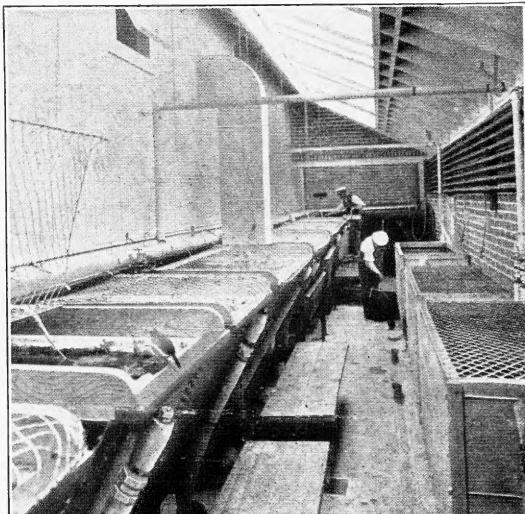
CEMENT No. 1
—1 oz. boiled linseed oil; 4 ozs. hard black tar; 1 oz. tallow; 1 lb. resin. Mix well and heat only enough to melt thoroughly.

In making up cement No. 2, heat the oil and dissolve the resin in it; then mix in the other

ingredients and work thoroughly. When the mixture has attained a sticky condition mix in enough glazier's putty to make possible cleanly handling. This cement must be kept warm until used, and should not be mixed up until you are ready for it, as it sets in an hour or two. When this cement is carefully mixed and properly used it is the most satisfactory cement known.

CEMENT No. 2.—8 ozs. litharge; 6 ozs. plaster Paris; 6 ozs. Portland ce-

(Continued on Page 72)



ATTENDANTS' PASSAGE—AQUARIUM



The First Exhibition of the Milwaukee Aquarium Society

By REV. PAUL ROTH

When the writer was a boy he secured permission to conduct an "aquarium" in an old bath-tub that had been retired from active service. Every form of aquatic life known to the average boy was given a place in it, from frogs and turtles to bullheads and eels. The entire juvenile neighborhood gathered in that bathroom, and there we enjoyed lively times, for "one touch of nature makes the whole world kin." Also there were lively times in the old tub, among the ill-assorted denizens of its vasty depths, until sister pulled the stopper and dealt liberty and death among them with impartial hand. But the charm had got in its work. Ever since then the life that is lived in the watery element has held for me a strange and compelling fascination. When word of the formation of a local society for the study of

aquatic life was received, I remembered the old tub and the crowds that gathered around it, and joined the new society.

There wasn't much science about that old bath-tub aquarium but there was a lot of bully good fun. We didn't learn much about hydro-biology, but we did learn something about human nature. It strikes me that the same forces which worked together in those days have been at work again today. I might be misread as implying that the members of our society have fitted out and shown off a lot of old "tubs," and so I hasten to say that this was not the case. I understand that a cut is to accompany this article, so that anyone may see that we have got out of the witches' cauldron stage of the game.

The initial exhibition was arranged in six divisions. First came the Goldfish varieties, displayed so as to make plain the development from the common golden carp up to the finest available



examples of what Oriental and American fanciers have been able to do with this so plastic form of life. Repeatedly the gorgeous beauties were likened to flowers that had the power to move about at will. To others they suggested the court ladies of the "ancient regime." A few, indeed, saw in them nothing but stupid, slimy fish. Especial mention should be made of the blue calico veil-tails, the shadowy, mysterious black-amoors, the mottled shubunkins, the Chinese lionheads and the celestial telescopes, shown here in public for the first time. As the exhibition was planned along educational lines rather than as a competition, only a few examples of each variety were shown; yet enough were there to reveal what a range of beauty, both of form and color, is to be found among the individuals of any particular variety.

The next division was given over to native fishes, chiefly from Milwaukee county. Without burdening this article with a lot of long Latin and Greek names, let me simply say that such fish as the shiners, dace, darters, mud-minnows, sunfish, killies, and silversides were shown, so that people might learn what species are suitable for the aquarium and easily obtained in this vicinity.

The third division was given over to tropical and sub-tropical fishes. Many species were shown, from the waters of every continent, their names all many times longer than the fishes they designated. Most popular were the Danios, of four kinds; the little bloodfins (*Tetragonopterus rubropictus*); the little "Gopies," the Mexican sword-tails, the red variety of the *Platypœcilia*. Young and old *Gambusia*, *Hemichromis*, *Polyacanthus*, *Macropodus*, *Heterandria*, and *Girardinus* were shown. Four species of

Haplochilus delighted the lovers of game fish by their resemblance to the pickerel and muskellunge tribe.

But by far the most interesting thing in the third section was a tank containing a pair of *Hemichromis bimaculatus* with their brood of unnumbered young, just a week old. This was doubly fascinating because of the excellent first-hand account of this fish from the pen of our Editor, appearing in the October AQUARIUM.

Section four comprised the household aquaria. Balanced tanks of all sizes, from preserve jars up to fifty gallon tanks, were shown. How some of these larger ones were transported without injury is a mystery to me, but it was done, and to the delight of every beholder.

Section five was given to various forms of plant life of interest and value to aquarists. And in Section six a number of odd and even grotesque forms of aquatic life were shown. Snails, "snail-farms," Japanese lizards, a young terrapin and a mud-puppy whose external gills furnished an inspiring talking point for both lecturers and spectators were there displayed.

An information bureau, a register for the names of interested visitors, a desk and blanks for those who desired to subscribe for THE AQUARIUM, a collection of implements, heating devices, fish-foods, and even part of the *materia medica*, used by those who doctor their pets, completed the exhibition.

Just a word about the general arrangement. Through the kindness of Gimbel Brothers, a large table, over fifty feet long, and covered with green burlap, had been placed at our disposal. Here the sixty or more tanks were arranged

(Continued on Page 70)



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Care and Breeding of Aquatic Life*

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VOL. II DECEMBER, 1913 NO. 7

Labor Without Reward

There has been more or less criticism regarding the magazine which would not be so prevalent if subscribers and advertisers took into consideration the fact that the entire labor of getting out the magazine is purely a labor of love. No one connected with the publication is paid a penny,—yet the work involved in getting suitable articles, editing them, soliciting advertisements and keeping the accounts is no small task. It means work and time, both of which are cheerfully given by those in charge—still most of us feel a certain pride and satisfaction for honors bestowed upon us, even though the honors are mere titles of office.

There is one person, however, who has done much to bring the little magazine up to its present standard, who hasn't even the satisfaction of having a title bestowed upon him—who has never re-

ceived the smallest credit for the wonderful work he has done—whose work, I dare say, is not appreciated by those who have noticed it. I refer to Mr. E. S. Young, the artist who has made the beautiful, life-like, true to nature, drawings of fish, which have from time to time appeared in this publication—who also worked for months during his leisure time to make the new cover design.

I have had the pleasure of meeting this kindly gentleman on several occasions. He is as modest regarding his wonderful work as he is lovable in character. Let us hope he will continue to lend us his ability in the matter of his drawings, for it would be hard to find any one capable of picturing the characteristics of the fishes in a manner as true to nature as Mr. Young has done. I have seen, only recently, a set of lantern slides of fish, which were made by an artist of considerable reputation, but the slides were poor in comparison with those cuts we have seen from time to time in the magazine.

Let us rise to a vote of thanks to Mr. E. S. Young.

Duty well done is noble; if properly advertised, it's fame.

The First Exhibition of the Milwaukee Aquarium Society

(Continued from Page 69)

according to the sections described. Graceful palms and ferns were grouped to good effect, an aerating system was installed, with feed pipes to each tank, and an abundance of electric light was shed over all. Members of the society explained the various sections to crowds of visitors. The exhibition opened Dec. 4th, and closed on evening of the 10th.



A Difference of Opinion in Regard to Goldfish

Two varying points of view on the goldfish question appear in the following, clipped from the Minneapolis Daily News:

Typhoid has dropped off nearly 100 per cent in Minneapolis since the filtration plant was put into service.

This was the announcement today at the health department.

So pure has the water become that goldfish cannot live in it. They die from lack of nutrition.

"Lots of people will tell you that city water is bad because their goldfish die in it," said Dr. J. Frank Corbett, city bacteriologist. That is where they fool themselves.

"The filtered water is so pure after coming through all that sand that there is no organic matter for the fish to feed on, and which they must have to live.

"We have frequent complaints from people telling us that their goldfish have died in city water."

Health Commissioner Dutton is wearing the smile that won't come off as a result of the decline in the typhoid death rate.

There were but nine deaths in January, compared to 14 in January a year ago. So far this month there have been but five deaths, while in the same period a year ago, ten were reported.

Why the Goldfish Die

Editor Daily News:

As a citizen of Minneapolis I would like to say a few words in reply to an article in the Daily News of Feb. 20, regarding the city filtered water. There's an old saying that "you can fool some

people some of the time, but you cannot fool all the people all the time." And with all due respect to Bacteriologist J. F. Corbett, will say that he is either woefully ignorant of fish life, or, worse yet, is wilfully trying to deceive the people regarding the city water. Let us hope he did not make the two statements in the article referred to above, for they are both absolutely false.

In the first place, water cannot be so pure that fish cannot live in it. To a fishman the idea is simply disgusting, and, in the second place, there is not, and never has been enough organic matter in the city water to sustain the life of a goldfish. All fish kept in confinement have to be fed artificial food to sustain life, though it is surprising how long fish will live without food.

What then is killing our pet fish? The answer is easy. The hypochloride of lime and other chemicals used in the water eat out their gills, and in many cases destroy their eyesight, and the fish die.

It is quite likely true that the chemicals used in the water have destroyed the fever germs, but, as one gentleman puts it, "they are going to give us a slow death instead of a quick one." And it will not be long before the doctors will be reaping a harvest from kindey and similar diseases, brought on those unfortunates who are compelled to drink the city water. Minneapolis will never have good water until it is piped from Lake Mille Lacs or Lake Superior.

F. L. TAPPAN,
President Minneapolis Aquarium Society.

The man who *never* makes mistakes, *never* makes anything else.



Useful Receipts

(Continued from Page 67)

ment; 2 ozs. resin, boiled oil and putty.

Those who are interested in fish-food will find the following a good one, and one which is not only greedily devoured by both native and foreign fish, but which also keeps them always in good condition.

First mix and pulverize all the ingredients, then mix just like dough; if after adding the eggs, the dough is too stiff, add water or, better, milk. Then bake in a pan like bread; as soon as well done and cold, break into pieces, next, after drying, grind through an ordinary coffee mill. The food will then be in the shape of fine granulated sugar, and should be put in boxes and kept free from moisture.

10 ozs. pea flour; 8 ozs. rice flour; 4 ozs. shredded codfish; 4 ozs. Pratt's dog-biscuit; $\frac{1}{2}$ oz. table salt; $\frac{1}{4}$ oz. Epsom salts; $\frac{1}{4}$ oz. plaster Paris; 4 ozs. herring roe; 4 eggs and 4 ozs. water (well beaten together); 6 ozs. oatmeal; 3 ozs. lean beef, chopped very fine. Dissolve the salts in the water and eggs.

In New York City, grocers keep herring roe the year round. It sells for 8 cents per pound can. It is a very valuable food, especially in the breeding season.

The Aquarium

For the benefit of those who have occasion to write to THE AQUARIUM we request that the following divisions of work be noted:

Any matters pertaining to editorials, articles for publication, society notices, or on subjects that have already appeared in this publication should be di-

rected to J. W. Gage, Editor-in-Chief, No. 8 South Dearborn St., Chicago.

Requests for sample copies, inquiries regarding purchase of fish or supplies, advertising rates and all matters pertaining to extension work should be directed to Mr. I. J. Ackerman, Business Manager, 6100 Ingleside Ave., Chicago.

Remittances of all kinds, whether for subscriptions or advertisements, which latter should be sent promptly, should be made to Mr. Floyd Young, Treasurer, 428 W. 66th St., Chicago.

Complaints concerning non-receipt of magazine, changes of address, and all matters connected with the distribution of this publication should be forwarded to Mr. W. B. Hoffman, Circulation Mgr., 253 Sibley St., Hammond, Ind.

COMMENTS AND QUERIES

Is it possible to prepare artificial sea water?—I. H. B.

According to a recent issue of the Bulletin of The New York Zoological Society, sea water can be easily prepared at a trifling cost by the following formula: Chloride of sodium (common table salt), 81 parts; chloride of potassium, 2 parts; chloride of magnesia, 10 parts; sulphate of magnesia (Epsom salts), 7 parts; total 100 parts. A pound of this mixture is sufficient to make about three gallons of artificial sea water. This should be filtered before use in the aquarium. Fresh water must be added in small quantities to replace loss by evaporation. The addition of sea water would eventually cause the salinity to become too great, inasmuch as the salts do not evaporate.

If you have a slight leakage in your tank, try painting over the cement (on the inside, of course) with asphaltum varnish.

C. G. B. SCHENK.

SOCIETY BULLETINS

Brooklyn Aquarium Society

Regular meetings 2nd & 4th Tues. in every month except July & Aug. at Fairchild Bldg. 702 Fulton St., at 8 P. M.
Initiation Fee, \$1.00
Annual Dues, \$2.00

Chicago Fish Fanciers' Club

Regular meetings on the Second Wednesday at 809-12 City Hall Square Building, 127-139 North Clark St., at 8:30 P. M. on 4th Wednesday where announced.
Initiation Fee, \$1.00
Annual Dues, \$4.00

The Aquarium Society

Regular meetings on the Second Thursday at the German-American School Sherman Ave., Jersey City, and on the Fourth Friday at the American Museum of Natural History, 77th St. and Central Park West, New York, each month except July and August. Corresponding membership \$1.00 Annually.
Initiation Fee, \$1. Dues, \$2

Philadelphia Aquarium Society

Regular meetings on the Fourth Wednesday, at 1414 Arch Street.
Initiation Fee, \$1.00 Annual Dues, \$1.80. Corresponding Membership, \$1.00 Annually.

Milwaukee Aquarium Society

Regular meetings on First Monday at 105 Grand Ave. Initiation Fee, \$1. Dues, \$1.20

Philadelphia Gold Fish Fanciers Society

Meets Third Wednesday evening of each month, except July and August, at Saul's Hall, 802-804 Girard Avenue, Philadelphia, Pa.
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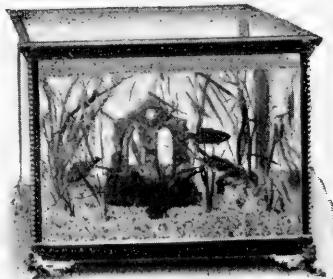
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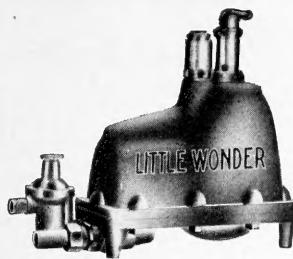
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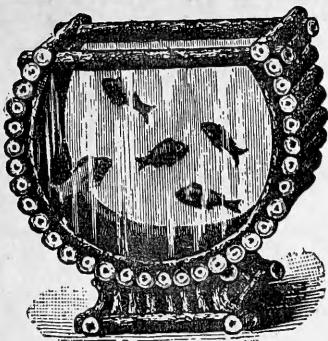
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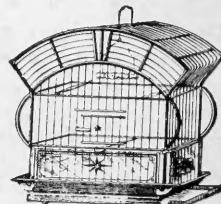
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